



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 1

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April 5, 2012

Mr. Philip Griffiths,
Undersecretary
Executive Office of Energy and Environmental Affairs
100 Cambridge Street
Boston, Massachusetts 02114

Dear Undersecretary Griffiths:

I am writing to you concerning recent challenges made by some about the science used in the Massachusetts Sustainable Water Management Initiative (SWMI) with respect to streamflow criteria development, focusing especially on the USGS report, *Factors Influencing Riverine Fish Assemblages in Massachusetts* (2011). My following comments are made as an appointee to the Technical Subcommittee for the SWMI process and reflect my experience in instream flow studies dating back to the mid-seventies.

SWMI reflects the currently advocated approach for setting regional ecological flow standards, and, as explained below, the science underpinning the SWMI approach is the most comprehensive statewide analysis of the ecological effects of flow alteration yet done, using the most current and widely accepted conceptual approach:

- The USGS study is based on the well-accepted theory for developing ecological flow standards;
- The focus on sensitive, fluvial dependent fish species makes the most sense and is appropriate;
- A regional approach to criteria development is better than a site-by-site approach for setting statewide standards.

Sound Theoretical Basis for Developing Ecological Flow Standards

Northeastern state agencies, USGS, FWS and EPA have been working for decades to develop streamflow techniques and policies targeted at quantifying flows necessary to protect aquatic life habitat and uses. Much of this work is based on the natural variation of flows and water levels following the "Natural Flow Paradigm" approach of Poff et al.¹. This approach has truly been paradigm shifting and is globally supported by aquatic experts. By 2010 every New England state had natural flow language in state law, regulation or policy.

In 2009, leading global river scientists and ecologists published a new framework for developing regional environmental flow standards known as the ecological limits of hydrologic alteration (ELOHA)². This

¹ Poff, N.L., Allen, J.D., Bain, M.B., Karr J.R., Prestagard, K.L., Richter, B.D., Sparks, R.E. and Stromberg, R.C., 1997, The Natural Flow Regime – a paradigm for river conservation and restoration: Bioscience, v.47, p769-784.

² Poff, N.L., Richter, B.D., Arthington, A.H., Bunn, S.E., Naiman, R.J., Kendy, E., Acreman, M., Apse, C., Bledsoe, B.P., Freeman, M., Henriksen, J., Jacobson, R.B., Kennen, J., Merritt, D.M., O'Keeffe, J., Olden, J.D., Rogers, K., Tharme,

approach builds on the “Natural Flow Paradigm” to synthesize existing hydrologic and ecological data bases from many river systems to develop scientifically defensible relationships between flow alteration and ecological responses.

This perspective represents a major advance by bridging the gap between the simplistic and often arbitrary hydrologic ‘rules of thumb’ presently being used for regional scale estimation of environmental flow needs and, at the other extreme, the detailed and often expensive environmental flow assessments being applied on a river-by-river basis. (Poff and others, 2009 p.4)

Prior to its publication in 2009, USGS scientists in Massachusetts were already following steps identified in the discussion drafts of ELOHA and had relied extensively on the scientific research articles upon which ELOHA is built. Two of the authors of ELOHA, Dr. Mary Freeman (USGS) and Dr. Jonathan Kennen (USGS), provided guidance and assistance for 2011 USGS report. During the development of MA “ELOHA” studies from 2001 on, the USGS at the Massachusetts Water Science Center and other researchers also benefited from multiple discussions with Michigan researchers who were developing a regional scale model for Michigan’s water withdrawal process³

Appropriate Focus on Flow-sensitive Species

Integral to the SWMI process are studies (USGS, 2011) which look at the effect of anthropogenic factors, such as flow alteration and impervious cover, on sensitive fluvial fish species. Species with known sensitivities to disturbances are commonly used as indicators of impairment. For example, multi-metric Indicators of Biotic Integrity are often used as a measure of urban disturbance. Flow sensitive species have been used in state streamflow standard processes in New England and elsewhere⁴ to indicate streamflow impairment. In this case, since flow alteration is an anthropogenic factor being investigated, it makes sense to focus the response variable on species that require flowing waters, rather than species that do not require flowing waters and are therefore insensitive to changes in the flow regime.

Suggestions early in the SWMI process to include species that were not sensitive to flow were considered by the Technical Committee and rejected. Since 1997 I have been part of the interagency management team (EPA, FWS, MA DEP and DFW, COE and CT DEP) for the Millennium Power project/Quinebaug River Study. The ecological studies for that project were under the direction of Dr. Mark Bain, a leading aquatic ecologist from Cornell University and a co-author of the Natural Flow Paradigm. Key to his approach was the classification of fish into habitat use classes.⁵ According to Bain, *The original fluvial specialist, macrohabitat generalist, fluvial dependent classification system was based*

R.E., and Warner, A., 2010, The ecological limits of hydrologic alteration (ELOHA)—A new framework for developing regional environmental flow standards: *Freshwater Biology*, v. 55, p. 147–170.

³ Hamilton, D.A. and Seelbach, P.W., 2011, Michigan’s Water Withdrawal Assessment Process and Internet Screening Tool, Michigan Department of Natural Resources, Fisheries Special Report 55, Lansing Michigan.

⁴ Rankin, E.T., Mueller, R. and Yoder, C.O., 2011, Ecological Low Flow Protection Process for Ohio Streams and Rivers of the Lake Erie Basin, Midwest Biodiversity Institute, Columbus, Ohio

⁵ Kinsolving, A.D., and Bain, M.B., 1993, Fish assemblage recovery along a riverine disturbance gradient: *Ecological Applications*, v. 3, no. 3, p. 531–544., Mark Bain, personal communication, 2011.

on strict definitions. This system isolated really sensitive fishes that reflect alterations of flowing waters. It has been used by many others for the same reasons.

Appropriate Regional Approach to Developing Statewide Standards

Inherent in the development of landscape-scale analyses of ecological processes is the understanding that at a state-level screening analysis such as SWMI, it is difficult to know what is going on at every single site. However, the opposite also holds true that models which look at every little area are often difficult to extrapolate to a wider scale.

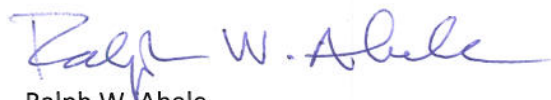
*In the experience of Dr. Paul Seelbach (now at the USGS, and a co-developer of the statewide water withdrawal rules for Michigan while at Michigan DNR), *The regional-scale, top-down approach provides the ability to understand the larger-scale system drivers (that are missed at local scales). It quantifies the central tendencies of the data relationships for the region; so while yes there is local noise; it is just as true that there are central tendencies. And it allows for extrapolation of findings across similar systems; thus allowing state-level science based regulatory programs.**⁶

As Instream Flow Coordinator for EPA Region 1 since 1998 I have advised each of the New England states on the development of streamflow standards and how to use the best available science for the development of environmental flow methods. This includes being appointed to the Connecticut DEP Commissioner's Advisory Committee (2005-2010) for the state's streamflow standards process and to the NH DES Technical Review Committees for protected instream flow studies for the Lamprey and Souhegan rivers. Prior to working at EPA I worked at the U.S. Fish and Wildlife Service from 1979-1998. During that time I had extensive interactions with the developer of the USFWS New England Flow policy and the FWS National Instream Flow Group in Ft. Collins, Colorado.

I believe that Massachusetts has a state-of-the art, comprehensive, peer-reviewed analytical approach for determining the effects of flow alteration on fish communities. The approach forms the basis for the categorization of basins across the state in terms of current biological conditions and is fully supported by the current state of instream flow science.

Please contact me at (617) 918-1629 if you have any questions.

Sincerely,



Ralph W. Abele

Instream Flow Coordinator
EPA Region 1
Office of Ecosystem Protection

Cc: Commissioner Kenneth Kimmel, MA DEP
Commissioner Mary Griffin, MA DF&G
Kathy Baskin, EOEEA
Ken Moraff, Naomi Detenbeck, EPA
Peter Weiskel, USGS

⁶ Paul Seelbach, personal communication, 2012